JHR 98: 971–1003 (2025)
doi: 10.3897/jhr.98.155469
https://jhr.pensoft.net

RESEARCH ARTICLE

JOURNAL OF Hymenoptera RESEARCH
A peer-reviewed open-access journal
The International Society of Hymenopterists

# Taxonomic update of *Psen* Latreille, 1796 (Hymenoptera, Crabronidae), with descriptions of three new species from China

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Academic editor: Michael Ohl | Received 10 April 2025 | Accepted 18 July 2025 | Published 30 October 2025

*https://zoobank.org/2F68E7F3-E474-48A8-8EA0-34317A37167A*

**Citation:** Deng Y, Ma L, Li Q (2025) Taxonomic update of *Psen* Latreille, 1796 (Hymenoptera, Crabronidae), with descriptions of three new species from China. Journal of Hymenoptera Research 98: 971–1003. https://doi.org/10.3897/jhr.98.155469

## Abstract

Three new species of the genus *Psen* Latreille, 1796 (Pemphredoninae: Psenini) from China are described: *P. scabristriatus* Deng & Ma, **sp. nov.**, *P. spinitarsalis* Deng & Ma, **sp. nov.** and *P. rhyssothoracicus* Deng & Ma, **sp. nov.** In addition, *P. brinchangensis* van Lith, 1965 is recorded from China and the male is described for the first time. An updated key to known and new species and a distribution map of Chinese *Psen* Latreille are provided.

## Keywords

Crabronidae, key, new record, *Psen*, taxonomy

## Introduction

The genus *Psen* Latreille, 1796, with no species included was erected by Latreille in 1796 who (1802) designated *Sphex ater* Fabricius, 1794 [= *Crabro ater* Olivier, 1792] as the type species of the genus. The genus is the second-largest within the tribe Psenini, with the number of species surpassed only by *Psenulus*. *Psen* can be readily distinguished from other Psenini by the following characteristics: the omaulus ending as it becomes ventral and turning a little posteriorly (differs from *Mimumesa*

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and *Pseneo*); the hindwing M diverges before cu-a (differs from *Psenulus*); dorsomedian area of the petiole is usually smooth, rarely has coarse punctures, without carina (differs from *Mimumesa* and *Deinomimesa*); male gastral sterna III -IV or only III or IV have erect setae at posterior margins, rarely without marginal setae (differs from *Nesomimesa*) (Bohart and Menke 1976).

Currently, the genus includes 97 species and 22 subspecies. These species are distributed across multiple regions: 12 species and two subspecies occur in the Palearctic Region, five in the Nearctic, 49 species and 17 subspecies in the Oriental, four in the Ethiopian, nine in the Neotropical, eight species and three subspecies in the Australo-Papuan, eight in both the Palearctic and Oriental, and four in both the Oriental and Australo-Papuan Regions (Cameron 1899; Turner 1912; Gussakovskij 1932; Malloch 1933; de Beaumont 1937; Merisuo 1938; Tsuneki 1959, 1966, 1967, 1971, 1973, 1974, 1982, 1983; van Lith 1959, 1965, 1968, 1973, 1974, 1975, 1976, 1978; Lomholdt 1975; Bohart and Menke 1976; Kazenas 1978; Budrys 1986; Wu and Zhou 1996; Nagase 2000; Amarante 2002; Dollfuss 2004; Pulawski 2025). To date, 28 species and six subspecies of *Psen* are known from China (Yunnan, Guizhou, Sichuan, Guangdong, Guangxi, Tibet, Zhejiang, Fujian, Chongqing, Hubei, Jiangxi, Shandong, Shanxi, Shaanxi, Henan, Beijing, Gansu, Qinghai, Inner Mongolia, Liaoning, Heilongjiang, Taiwan) (Gussakovskij 1932; Malloch 1933; de Beaumont 1937; Merisuo 1938; van Lith 1968, 1974, 1975; Tsuneki 1974, 1983; Bohart and Menke 1976; Kazenas 1978; Budrys 1986; Wu and Zhou 1996; Hua 2006; Ma and Li 2006; Ma and Li 2007; Jiang et al. 2021; Deng et al. 2025), comprising 28.9% of the global total.

China is currently experiencing a significant surge in the discovery and description of new species, owing to its unique geographical location at the intersection of several zoogeographical regions and its exceptionally high environmental heterogeneity. These distinctive features have created particularly favorable conditions for diversification of *Psen*. Furthermore, our ongoing field investigations have revealed that a substantial number of undetected species remain to be documented, highlighting the immense potential for future taxonomic research in China. In the present study, three new species from China, *P. scabristriatus* Deng & Ma, *P. spinitarsalis* Deng & Ma, and *P. rhyssothoracicus* Deng & Ma are described and illustrated. In addition, *P. brinchangensis* van Lith, 1965 is first recorded from China and its male is described for the first time, and a key to the known species and a distribution map in China are provided, along with high-quality color photographs of these species.

## Material and methods

The specimens examined are deposited in Yunnan Agricultural University, Kunming, China (YNAU). Specimens were photographed using a stereomicroscope (Keyence VHX-5000) equipped with a digital microscopic system. Plates were processed with Adobe Photoshop® 2020 software. For the terminology we mainly follow Bohart and

Menke (1976), but the term propodeal pad may be unfamiliar. It is located between the propodeal enclosure and the posterior surface of the propodeum. The abbreviations are as follows:

**HLD** head length in dorsal view (distance from the frons to the occipital margin in the middle)
**HLF** head length in frontal view (distance from the vertex to the clypeal margin in the middle)
**HW** head width (dorsal view, maximum)
**AOD** antenna-ocular distance (frontal view)
**WAS** width of antennal socket (frontal view)
**IAD** interantennal distance (frontal view)
**POD** post-ocellar distance (distance between the inner margins of a hind ocelli)
**OOD** ocellocular distance (distance between the outer margin of a hind ocellus and the nearest inner orbit)
**OCD** ocello-occipital distance (distance between the posterior margin of the hind ocellus and the occipital margin, dorsal view)
**PW** petiole width (dorsal view, in the middle)
**PL** petiole length (lateral view)
**LT I** maximum length of gastral tergum I (dorsal view)
**WT I** maximum width of gastral tergum I (dorsal view)
**HFL** maximum length of hind femur
**HTL** maximum length of hind tibia.

## Results

### *Psen* Latreille, 1796

**Type species.** *Psen ater* (Olivier, 1972) of Vander Linden, 1829 [= *Sphex ater* of Panzer, 1799 = *Sphex ater* Fabricius, 1794 = *Crabro ater* Olivier, 1792], by monotypy.

## Key to the species of *Psen* Latreille, 1796 from China

**Female** (unknown for *P. spinitibialis* Ma & Li, 2007; *P. foveicornis* Tsuneki, 1982; *P. seriatispinosus* Ma & Li, 2006; *P. assamensis* van Lith, 1965; *P. shukuzanus* Tsuneki, 1972)

1 Gastral terga I–V with dense or sparse, long or short erect setae at posterior margins (Fig. 3B) ..... **2**
– Gastral terga I–V without erect setae at posterior margins (Figs 1B, 5B) ..... **9**
2 Petiole cylindrical, without carina or keel (Figs 3B, 7B) ..... **3**
– Petiole subquadrate, lateral surface with one carina on each side, ventral surface with or without keel (Figs 1B, 5B) ..... 7

3 Propodeal enclosure with sturdy longitudinal rugae, propodeal pad narrow, smooth and shiny; gastral terga I–V with long, straight erect setae at posterior margins; petiole with blue shine; clypeus with golden setae (Fig. 3C) (China: Taiwan)..... ***P. sauteri*** **van Lith, 1968**

– Propodeal enclosure with slender longitudinal rugae, sometimes extending to propodeal pad (Figs 3G, 5G); gastral terga I–V with straight or somewhat curving, short setae; petiole without shine; clypeus with golden or silvery setae (Figs 3C, 7C) ..... **4**

4 Legs black except gray-white tibial spur, tarsi brown; gaster black (Figs 1B. 5B) (China: Taiwan) ..... ***P. terayamai*** **Tsuneki, 1982**

– Legs largely fulvous or reddish brown; most of gaster yellowish brown or reddish brown to dark brown (Figs 3B, 7B) ..... **5**

5 Base of gastral sternum II with conspicuous U-shaped depression (China: Zhejiang, Sichuan)..... ***P. lacuniventris*** **Ma & Li, 2007**

– Base of gastral sternum II complete, without depression (China: Hubei, Hunan, Guangdong, Guizhou) ..... **6**

6 Frons shiny, with sparse, tiny punctures; clypeus with silvery setae (Fig. 7C); gastral tergum I reddish brown or yellowish brown (Fig. 7A) (China: Yunnan; Malaysia) ..... ***P. brinchangensis*** **van Lith, 1965**

– Frons shiny, with dense, fine punctures, interspaces equal to puncture diameter; clypeus with gold setae (Fig. 3C); gastral tergum I dark brown (Fig. 3A) (China: Hubei, Hunan, Guangdong, Guizhou) ..... ..... ***P. spinitarsalis*** **Deng & Ma, sp. nov.**

7 Propodeal enclosure ill delimited, not impressed; second recurrent vein received by second submarginal cell (Fig. 1A); ventral surface of petiole with keel posteriorly, and large punctures on each side; pygidial plate with one or two rows of large punctures and setae (Fig. 5J) (China: Yunnan, Guangxi, Sichuan, Taiwan; Indonesia) ..... ***P. lieftincki*** **van Lith, 1959**

– Propodeal enclosure well delimited by triangular or lunular carina, not or shallowly impressed; second recurrent vein received by third submarginal cell or interstitial (Figs 3A, 5B, 7B); ventral surface of petiole without keel, impunctate or with tiny punctures on each side; pygidial plate with five or six rows of large punctures and setae (Figs 3J, 7J)..... **8**

8 Acetabular carina short, 0.7× as long as foretarsus I; gastral terga I–V with sparse marginal setae, short and straight, silvery; gastral segments I–II, petiole ventrally bright reddish (China: Hunan, Yunnan; Nepal; India)..... ..... ***P. rufoannulatus*** **Cameron, 1907**

– Acetabular carina lacking; gastral terga I–V with dense marginal setae, long and straight, golden; gastral segment I partly reddish brown to dark brown, gastral segment II and petiole black (China: Yunnan) ..... .....***P. yunnanensis*** **Ma & Li, 2007**

9 Petiole cylindrical, lateral surface not carinate or with one inconspicuous, slender carina (Figs 3B, 7B), ventral surface without keel ..... **10**

– Petiole subquadrate, lateral surface with pair of slender or sturdy carinae (Figs 1B, 5B), ventral surface with or without keel ..... **17**

10 Mandible much broadened ..... **11**

– Mandible narrow or just somewhat broad medially or apically ..... **12**

11 Propodeal pad narrow, smooth, shiny; upper frons with dense, fine punctures (Figs 3C, 5C); ocellar area and vertex with dense, midsize punctures, vertex without transverse sulcus behind hind ocelli (China: Hubei, Zhejiang, Guangdong, Guizhou; Japan) ..... ***P. kulingensis* van Lith, 1965**

– Propodeal pad with dense, slender, longitudinal rugae; upper frons, ocellar area and vertex with sparse, tiny punctures, vertex with deep transverse sulcus behind hind ocelli (China: Taiwan) ..... ***P. shirozui* Tsuneki, 1966**

12 Mandible somewhat broadened medially or apically ..... **13**

– Mandible narrow ..... **15**

13 Pygidial plate broadly triangular, mat, with several rows of large punctures and setae (Figs 3J, 7J); second recurrent vein of forewing received by second submarginal cell (Figs 1A, 5B) (China: Shandong; Korea; Japan) ..... ***P. aurifrons* Tsuneki, 1959**

– Pygidial plate narrowly triangular, smooth and shiny, with few midsize punctures or impunctate basally (Fig. 1J); second recurrent vein received by third submarginal cell (Figs 3A, 7B) ..... **14**

14 Ocellar area and vertex slightly convex; gaster black (China: Yunnan; Nepal; India) ..... ***P. simlensis* van Lith, 1968**

– Ocellar area flat, vertex distinctly convex; gastral terga I–IV posteriorly, terga V–VI, and sternum III except median area bright yellowish-brown, remainder black (China: Sichuan; Indonesia) ... ***P. rubicundus lawkensis* van Lith, 1959**

15 Upper frons, ocellar area, and vertex with very sparse, fine punctures; scutum with sparse, tiny punctures anteriorly and laterally, remainder with sparse, fine to midsize punctures; legs largely fulvous (China: Yunnan; Philippines; India; Japan) ..... ***P. opacus* van Lith, 1959**

– Upper frons, ocellar area, and vertex with dense, small to midsize punctures; scutum with dense, fine to large punctures; legs dark brown to black largely ..... **16**

16 Scutum with dense, fine punctures (Fig. 7F); area between ocelli with longitudinal sulcus, behind hind ocelli with transverse sulcus; lateral surface of petiole with shallow groove and slender carina (China: Yunnan, Sichuan, Taiwan; Japan; Korea; Russia) ..... ***P. affinis* Gussakovskij, 1937**

– Scutum with dense, midsize to large punctures (Fig. 1F); area between ocelli without sulcus, behind hind ocelli without transverse sulcus; lateral surface of petiole without groove or carina (Fig. 3B) (China: Henan, Zhejiang, Fujian, Chongqing, Yunnan, Tibet; India) ..... ***P. fuscinervis* (Cameron, 1899)**

17 Propodeal pad with sparse or dense, long, longitudinal rugae (Figs 3G, 5G) ...**18**
– Propodeal pad narrow or broad, smooth and shiny (Fig. 1G).....**22**
18 Mandible narrow; basal half of pygidial plate slightly convex; propodeum without bronzy shine (Figs 3G, 5G, 7G) .....**19**
– Mandible much broadened, leaf-like medially and apically, subapical area with unblemished, small tooth; pygidial plate not convex; propodeum with bronzy shine (Fig. 1G) .....**20**
19 Interantennal tooth markedly elevated; pygidial plate with several rows of large punctures and setae (Fig. 3J) (China: Heilongjiang, Jilin, Gansu, Beijing, Shandong, Zhejiang, Shanxi; widespread in Asia and Europe).....
.....***P. ater* (Olivier, 1972)**
– Interantennal tooth moderately elevated (Fig. 5C); pygidial plate with one row of sparse and fine punctures (Fig. 5J) (China: Tibet) .....
.....***P. rhyssothoracicus* Deng & Ma, sp. nov.**
20 Lateral surface of petiole with pair of slender carinae, ventral surface with slender, inconspicuous keel (China: Shanxi, Sichuan, Taiwan) ....***P. bnun* Tsuneki, 1971**
– Lateral surface of petiole with pair of sturdy carinae and deep groove, ventral surface with conspicuous keel .....**21**
21 Free margin of clypeus with deep, semicircular depression on each side; scutum with dense, fine punctures anteriorly, remainder with dense, midsize to large punctures (China: Henan, Zhejiang).....***P. ussuriensis* van Lith, 1959**
– Free margin of clypeus without depression laterally; scutum with dense, large punctures (China: Guangdong) .....***P. scabrosus* Deng, Ma & Li, 2025**
22 Propodeal pad broadly quadrate, smooth and shiny (Fig. 1G).....**23**
– Propodeal pad narrow, smooth and shiny.....**25**
23 Pygidial plate coriaceous, mat, with one or two rows of large punctures and setae (China: Beijing, Shandong, Zhejiang, Fujian, Guangdong, Guangxi, Yunnan; Indonesia; India; Sri Lanka; Malay Archipelago; Japan; Nepal) .....
.....***P. nitidus* van Lith, 1959**
– Pygidial plate smooth, shiny, coriaceous apically, with one row of large punctures and setae (Figs 1J, 5J) .....**24**
24 Scutum with dense, fine punctures anteriorly, remainder with dense and midsize to large punctures (Fig. 1F); scutellum with sparse, midsize to large punctures (Fig. 1G) (China: Yunnan, Hunan) .....
..... ***P. scabristriatus* Deng & Ma, sp. nov.**
– Scutum with sparse, tiny to fine punctures anteriorly (Fig. 7E); scutellum with sparse, fine punctures (Fig. 7F) (China: Hainan; Indonesia) .....
.....***P. amboinensis* van Lith, 1965**
25 Pygidial plate narrowly triangular, smooth and shiny, with or without a few punctures.....**26**
– Pygidial plate broadly triangular, coriaceous, mat or somewhat shiny, with one or two rows of fine or midsize punctures .....**27**

26 Interantennal tooth moderately elevated, bluntly tooth-like; second recurrent vein received by second submarginal cell (Fig. 5A); antenna fulvous largely (China: Sichuan; Japan) ..... ***P. bettoh attenuatus*** **Tsuneki, 1977**

– Interantennal tooth slightly elevated, conical; second recurrent vein received by second submarginal cell (Fig. 1A); antenna brown beneath (China: Taiwan; Korea; Russia; Japan) ..... ***P. koreanus formosensis*** **Tsuneki, 1965**

27 Mandible narrow; pronotal collar with anterolateral corner not forming tooth (China: Taiwan) ..... ***P. alishanus*** **Tsuneki, 1967**

– Mandible somewhat broadened medially or apically; pronotal collar without anterolateral corner ..... **28**

28 Lateral surface of petiole with sturdy carina, ventral surface with sturdy keel (China: Jilin, Inner Mongolia, Qinghai, Tibet, Sichuan, Yunnan, Taiwan; Korea; Russia; Japan) ..... ***P. seminitidus*** **van Lith, 1965**

– Lateral surface of petiole with slender carina and deep groove, ventral surface without keel ..... **29**

29 Upper frons with fine punctures, ocellar area and vertex with sparse, fine punctures; second recurrent vein received by second submarginal cell; antenna beneath largely, gastral tergum I laterally, femora apically, tibiae, and tarsi reddish brown; head and thorax with bronzy shine (China: Taiwan) ..... ***P. tanoi*** **Tsuneki, 1967**

– Upper frons with fine to midsize punctures and slender, longitudinal rugae, ocellar area and vertex with dense, midsize to large punctures; second recurrent vein received by third submarginal cell; antenna and gaster black, legs largely black; head and thorax without bronzy shine (Fig. 5E–G) (China: Inner Mongolia, Shaanxi, Yunnan) ..... ***P. fronistriatus*** **Deng, Ma & Li, 2025**

**Male** (unknown for *P. amboinensis* van Lith, 1965; *P. opacus* van Lith, 1959; *P. terayamai* Tsuneki, 1982; *P. lacuniventris* Ma & Li, 2007; *P. sauteri* van Lith, 1968; *P. scabrosus* Deng, Ma & Li, 2025)

1 Gastral sterna III–IV without erect setae at posterior margins (China: Inner Mongolia, Shaanxi, Yunnan) ..... ***P. fronistriatus*** **Deng, Ma & Li, 2025**

– Gastral sterna III–IV or III or IV with erect setae at posterior margins ..... **2**

2 Only gastral sternum III or IV with erect setae at posterior margin ..... **3**

– Gastral sterna III and IV with erect setae at posterior margins ..... 7

3 Gastral sternum III with dense, erect setae at posterior margin, dark brown, somewhat long and straight; acetabular carina lacking, mesosternum with two or three sturdy, long, longitudinal carinae on each side of ventral median carina (China: Sichuan; Indonesia) .... ***P. rubicundus lawkensis*** **van Lith, 1959**

– Gastral sternum IV with erect setae at posterior margin, fulvous to dark brown, short and straight (Fig. 6B); acetabular carina lacking or short, mesosternum without longitudinal carina ..... **4**

4 Propodeal pad with sparse or dense, long, longitudinal rugae (Fig. 6I) (China: Tibet) ..... ***P. rhyssothoracicus* Deng & Ma, sp. nov.**

– Propodeal pad narrow or broad, smooth and shiny (Fig. 2F)..... **5**

5 Mandible narrow, petiole cylindrical, lateral surface not carinate or with inconspicuous carina (Figs 4B, 8B) (China: Taiwan) ..... ***P. alishanus* Tsuneki, 1967**

– Mandible somewhat broadened medially, petiole subquadrate, lateral surface with one or two sturdy carinae (Figs 2B, 6B) ..... **6**

6 Ventral surface of petiole without keel (Fig. 2I); upper frons, ocellar area and vertex with dense or sparse, tiny punctures, ocellar area flat; antennal articles III–XII beneath with tubercles (China: Sichuan, Taiwan; Japan)..... ..... ***P. bettoh attenugius* Tsuneki, 1977**

– Ventral surface of petiole with sturdy keel; upper frons with dense, fine punctures and longitudinal rugae, ocellar area and vertex with dense, fine punctures, markedly convex; antennal articles V–VI or V–VII beneath with linear carinae (China: Jilin, Inner Mongolia, Qinghai, Tibet, Sichuan, Yunnan, Taiwan; Korea; Russia; Japan)..... ***P seminitidus* van Lith, 1965**

7 Gastral terga I–V with dense or sparse, long or short erect setae at posterior margins (Fig. 8B)..... **8**

– Gastral terga I–V without erect setae at posterior margins (Figs 2B, 6B) ... **13**

8 Mandible much broadened, tooth leaf-like, inner margin with small tooth medially and 1/3 from apex; interantennal tooth long, nail-like, sharp; antenna beneath without tyloid (Fig. 2D) (China: Yunnan, Guangxi, Sichuan, Taiwan; Indonesia)..... ***P. lieftincki* van Lith, 1959**

– Mandible narrow, inner margin with tooth subapically; interantennal tooth small, tooth-like, somewhat sharp; antenna beneath with tyloids or excavations (Figs 4D, 8D) ..... **9**

9 Petiole cylindrical, lateral surface without carina, ventral surface without keel (Figs 4B, 8B) ..... **10**

– Petiole subquadrate, lateral surface with carina, ventral surface with or without keel (Figs 2B, 6B) ..... **11**

10 Mid basitarsus with row of mid-length spines on externoventral surface, apically with long spine (Fig. 4J, K); scutum with sparse, tiny punctures anteriorly, remainder with dense and fine to midsize punctures (Fig. 4F) (China: Hubei, Hunan, Guangdong, Guizhou) ..... ***P. spinitarsalis* Deng & Ma, sp. nov.**

– Mid basitarsus usual without spine; scutum shiny, with dense, tiny to fine punctures (Fig. 8F) (China: Yunnan; Malaysia)..... ..... ***P. brinchangensis* van Lith, 1965**

11 Gastral terga I–V with sparse, short, straight, silvery erect setae at posterior margins; gastral segments I-II laterally bright reddish brown (China: Hunan, Yunnan; Nepal; India) ..... ***P. rufoannulatus* Cameron, 1907**

– Gastral terga I–V with dense, long, curving or straight, golden or yellowish erect setae at posterior margins; gastral tergum I largely or wholly reddish brown, remaining gaster black ..... **12**

12 Ventral surface of petiole with keel; second recurrent vein received by second submarginal cell; antennal articles VI–XIII beneath with oval tubercles, black, smooth and shiny (China: Zhejiang) ..... ***P. spinitibialis*** **Ma & Li, 2007**

– Ventral surface of petiole without keel; second recurrent vein received by third submarginal cell (Fig. 8B); antennal articles VI–XI beneath with elliptic tubercles (China: Zhejiang) ..... ***P. yunnanensis*** **Ma & Li, 2007**

13 Propodeal pad with longitudinal rugae or reticulation (Figs 4H, 6I) ..... **14**

– Propodeal pad narrow or broad, smooth and shiny (Fig. 2F, G) ..... **21**

14 Mid basitarsus or mid tarsomeres I-IV apically with angular or spinose expansions; mandible narrow or somewhat broadened medially and apically ..... **15**

– Mid tarsomeres I-IV simple; mandible much broadened..... **18**

15 Petiole cylindrical, lateral surface without carina (Figs 4B, 8B)..... **16**

– Petiole subquadrate, lateral surface with carina (Figs 2B, 6B) ..... **17**

16 Apical half of mandible broad; mid basitarsus with auriform prominence; second recurrent vein received by second submarginal cell; antennal articles VI–XIII beneath with elliptic excavations (China: Shandong; Korea; Japan). ..... ***P. aurifrons*** **Tsuneki, 1959**

– Mandible narrow; mid basitarsus markedly produced posteriorly; second recurrent vein received by third submarginal cell; antennal article V with small, elliptic tyloid, articles VI–XIII with large, oval excavations (China: Zhejiang; Guangxi; Taiwan) ..... ***P. foveicornis*** **Tsuneki, 1982**

17 Inner margin of mid basitarsus with row of 6 nail-form spines basally, and long spine on 1/3 from base; antennal articles III–XI beneath with tyloids (China: Guizhou) ..... ***P. seriatispinosus*** **Ma & Li, 2006**

– Mid basitarsus with an angular prominence medially and posteriorly; antennal articles VI–XIII beneath with tyloids (China: Heilongjiang, Jilin, Gansu, Beijing, Shandong, Zhejiang, Shanxi; widespread in Asia and Europe) ..... ..... ***P. ater*** **(Olivier, 1972)**

18 Petiole cylindrical (Figs 4B, 8B); free margin of clypeus with broad, shallow emargination (China: Taiwan) ..... ***P. shirozui*** **Tsuneki, 1966**

– Petiole subquadrate (Figs 2B, 6B); free margin of clypeus with deep, semicircular emargination ..... **19**

19 Lateral surface of petiole with one carina, apical half with dense, midsize punctures, ventral surface without keel; interantennal tooth blunt apically (China: Zhejiang; India) ..... ***P. assamensis*** **van Lith, 1965**

– Lateral surface of petiole with two carinae, with or without deep groove medially, ventral surface with conspicuous keel; interantennal tooth sharp apically ..... **20**

20 Free margin of clypeus without depression; second recurrent vein received by third submarginal cell or interstitial; scutum with sparse, fine punctures (Fig. 8F) (China: Shanxi; Sichuan; Taiwan)..... ***P. bnun*** **Tsuneki, 1971**

– Free margin of clypeus with deep semicircular depression on each side; second recurrent vein received by second submarginal cell; scutum with dense,

fine punctures anteriorly, remainder with dense, midsize to large punctures (China: Henan, Zhejiang; Russia; Sweden; Japan; Korea) ..... ***P. ussuriensis* van Lith, 1959**

21 Propodeal pad broadly quadrate, smooth and shiny (Fig. 2G); acetabular carina much longer ..... **22**

– Propodeal pad narrow or somewhat broad, smooth and shiny; acetabular carina lacking or short or somewhat long ..... **23**

22 Scutum with sparse, fine punctures, interspaces larger than puncture diameter; hind tibia without spine on outer surface (China: Beijing, Shandong, Zhejiang, Fujian, Guangdong, Guangxi, Yunnan; Indonesia; India; Sri Lanka; Malay Archipelago; Japan; Nepal) ..... ***P. nitidus* Tsuneki, 1966**

– Scutum with dense, midsize to large punctures, interspaces equal to or less than puncture diameter (Fig. 2H); hind tibia with row of slender, yellow spines on outer surface (Fig. 2B) (China: Yunnan, Hunan) ..... ***P. scabristriatus* Deng & Ma, sp. nov.**

23 Mandible broad or at least apical half somewhat broadened ..... **24**

– Mandible narrow ..... **26**

24 Petiole subquadrate, lateral surface with pair of carinae (Figs 2B, 6B), with or without deep groove ..... **25**

– Petiole cylindrical, lateral surface without carina or groove (Figs 4B, 8B) ..... **27**

25 Setae on head, thorax, and legs golden; upper frons with dense, fine punctures, ocellar area and vertex with sparse, fine punctures (China: Taiwan) ..... ***P. tanoi* Tsuneki, 1967**

– Setae on head, thorax, and legs silvery; upper frons, ocellar area and vertex with sparse, large punctures (China: Taiwan; Korea; Russia; Japan) ..... ***P. koreanus formosensis* Tsuneki, 1965**

26 Ocellar area, vertex and scutum with sparse, tiny to fine punctures (Fig. 8E, F); antennal articles V–VIII beneath with linear carinae (China: Yunnan; India; Nepal) ..... ***P. simlensis* van Lith, 1968**

– Ocellar area and vertex with dense, midsize punctures; scutum with dense, large punctures; antennal articles IV–XI beneath with broad, cylindrical tyloids (Fig. 8D), III and XII beneath with linear carinae (China: Hubei, Zhejiang, Guangdong, Guizhou; Japan) ..... ***P. kulingensis* van Lith, 1965**

27 Petiole subquadrate, lateral surface with broad furrow or carina (Fig. 6B) (China: Taiwan) ..... ***P. shukuzanus* Tsuneki, 1972**

– Petiole cylindrical, lateral surface without furrow or carina, or with slender carina and shallow groove (Figs 4B, 8B) ..... **28**

28 Acetabular carina lacking; antennal articles III–XI beneath with tyloids, on articles III–X long tubercles, on article XI short carina (China: Sichuan, Yunnan, Taiwan; Japan; Korea; Russia) ..... ***P. affinis* Gussakovskii, 1937**

– Acetabular carina short, 0.3× as long as foretarsus I; antennal articles IV–XIII beneath with linear carinae (China: Henan; Zhejiang; Fujian; Chongqing; Yunnan; Tibet; India) ..... ***P. fuscinervis* (Cameron, 1899)**

**1. *Psen scabristriatus* Deng & Ma, sp. nov.**
https://zoobank.org/0F32CB1B-F78F-40AE-BD19-2C7988ED7F23
Figs 1A–J, 2A–N

**Type material.** ***Holotype.*** China • ♀; Yunnan Province, Kunming City, Panlong District, Xiaohe Township; 25°11'42.84"N, 102°50'09.43"E; 1988 m a.s.l.; 29.VII.2006; NO.200601062; coll. Hesheng Wang; sweep net. ***Paratypes.*** China • 4 ♂♂; Hunnan Province, Chenzhou City, Yizhang County, Mangshan Forest Park; 24°57'20.02"N, 112°51'7.49"E; 629 m a.s.l.; 13.VIII.2010; NO.202003627, NO.202003630-202003632; sweep net. China • ♂; Yunnan Province, Xishuangbanna Autonomous Prefecture, Menghai County, Blangshan Township; 21°44'44.7"N, 100°26'4.2"E; 1621 m a.s.l.; 17.V–VI.20.2018; NO.2019000147; malaise trap. All types deposited in YNAU.

**Diagnosis.** The new species is similar to *Psen nitidus* van Lith, 1959 sharing with it the following: 1) propodeal pad with smooth, broad area; 2) gastral sterna III–IV with yellowish-brown fasciculate setae on hind margins in male. It differs from *Psen nitidus* and other congeners by the following characteristics (characters of *P. nitidus* given in parentheses): 1) anterior acetabular carina with many long, oblique striae in prepectus medially, more conspicuous in male (with few and inconspicuous, transverse striae); 2) most of scutum with dense, midsize to large punctures, interspaces equal to or less than puncture diameter (with sparse, fine punctures, interspaces larger than puncture diameter); 3) scutellum with an inconspicuous, longitudinal depression (scutellum flat); 4) episcrobal area conspicuously convex, distinctly higher than mesopleuron (episcrobal area usual); 5) hind tibia with row of slender, yellow spines on outer surface in male (without spine); 6) pygidial plate broadly triangular, 1.5× as long as wide basally, medially with distinct inverted-triangular convexity, shiny and smooth; laterally with one or two rows of coarse, midsize punctures and stiff bristles, coriaceous (pygidial plate narrowly triangular, 1.9× as long as wide basally; laterally with one or two rows of coarse, large punctures and stiff bristles, coriaceous).

**Description. Female.** Body length 8.6 mm. Black; mandible apically and basally, most of antennae, mid and hind tibiae, tegula, and wing veins brown. Mandible medially, antennal articles I apically and II, fore tibiae, margin of gastral terga and sterna II–V yellowish brown; tarsi yellow. Head, scutum and femora cyaneous or with purple bronze shine. Appressed setae on clypeus silvery; vertex, scutum, scutellum and metanotum with appressed pale yellow pubescence and long erect setae. Mid-length setae on mesopleuron, legs, propodeum, and lateral and ventral side of petiole silvery; gaster with very sparse and short, silvery pubescence (Fig. 1A, B).

***Head.*** Clypeus with dense, fine punctures, clypeal middle lobe with shallow, arcuate emargination, side with two obtuse teeth, basal half of clypeal disk moderately elevated (Fig. 1C). HW: HLF: AOD: WAS: IAD = 82: 62: 3: 7: 12. Mandible bidentate apically, wide basally: medially: apically = 15: 10: 3. Interantennal tooth moderately elevated, apex slightly acute; frontal carina conspicuous, extending from median ocellus to apex of interantennal tooth (Fig. 1C). Scape slightly bent, relative lengths of articles III–XII = 16, 10, 10, 11, 10, 10, 9, 9, 9, 12; article III approximately 3.2× as long as wide apically,

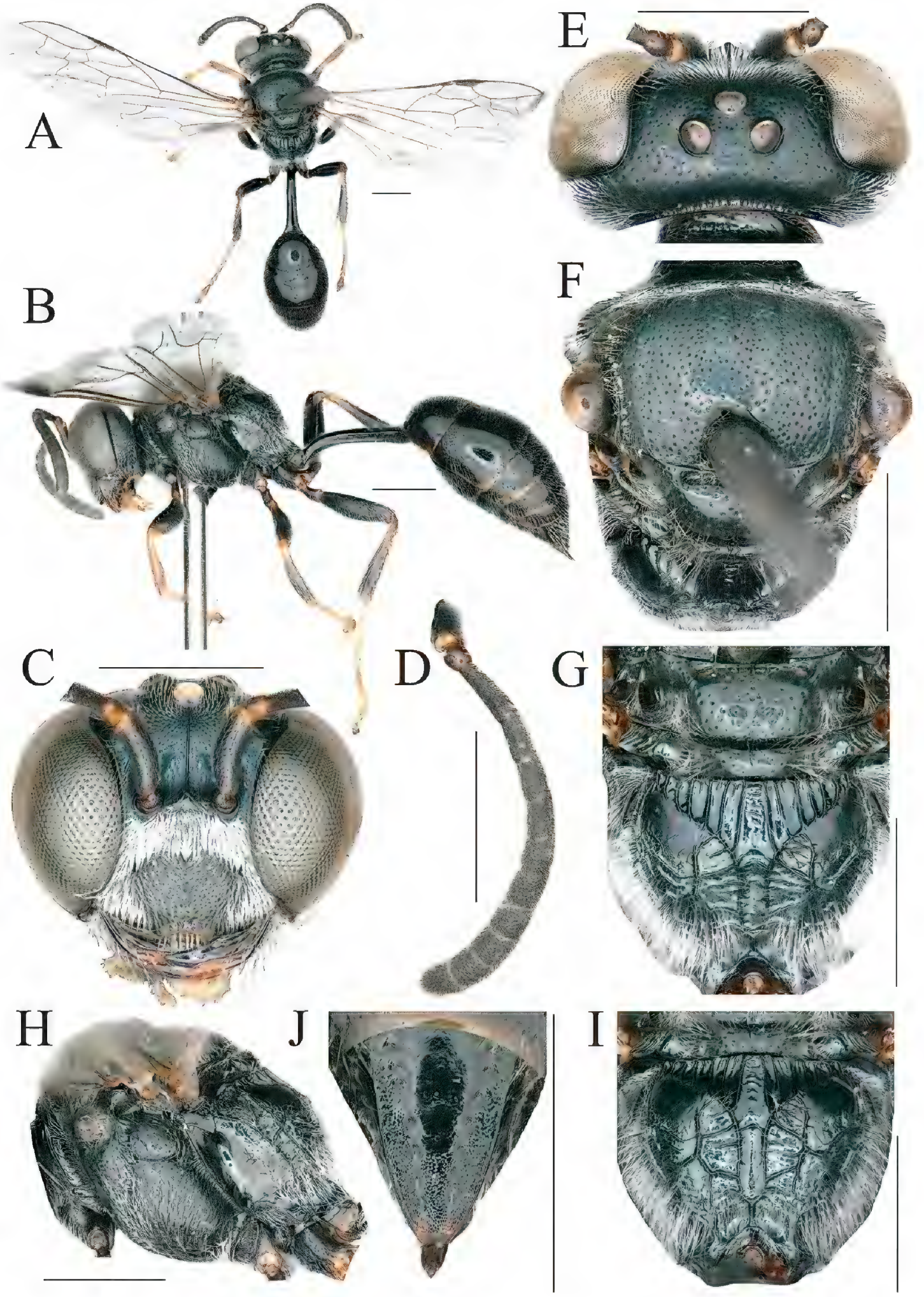


**Figure 1.** *Psen scabristriatus* Deng & Ma, sp. nov. Female. Holotype. **A.** Habitus, dorsal view; **B.** Habitus, lateral view; **C.** Head, frontal view; **D.** Antennae; **E.** Head, pronotum and scutum, dorsal view; **F.** Scutellum and metanotum, dorsal view; **G.** Propodeum, dorsal view; **H.** Thorax, lateral view; **I.** Propodeum, posterior view; **J.** Pygidial plate, dorsal view. Scale bar: 1 mm.

article IV about 2×, article about XII 1.5×, respectively (Fig. 1D). Frons shiny, with sparse, fine to midsize punctures, medially dense, laterally sparse, punctures gradually increasing in size from lower frons to mid ocellus (Fig. 1C). Interocellar area and vertex shiny, with sparse, fine to midsize punctures, interspaces larger than on frons; ocellar area not raised, behind postocelli with deep sulcus, vertex behind postocelli not raised, occipital carina crenulate (Fig. 1E). HW: HLD: POD: OOD: OCD = 82: 32: 9: 12: 15.

***Thorax.*** Scutum with dense, fine punctures anteriorly, remainder with dense, midsize to large punctures, interspaces equal to or less than puncture diameter. Admedian lines and notauli inconspicuous, nearly parallel (Fig. 1F). Scutellum with sparse, midsize to large punctures, interspaces larger than puncture diameter, also larger than that in scutum, with an inconspicuous, longitudinal depression; metanotum with sparse, tiny punctures, with two small prominences and slightly longitudinal depression medially (Fig. 1G). Epicnemial area shiny, with sparse, tiny punctures, omaulus ending as it becoming ventral and below normally curved backwards. Mesopleuron shiny, with sparse, tiny punctures, posteriorly with short, longitudinal striae; episcrobal area conspicuously convex, distinctly higher than mesopleuron. Metapleuron smooth, upper part with sparse, oblique striae (Fig. 1H). Mesosternum with acetabular carina, with many long, oblique striae in prepectus medially; longitudinal medioventral carina conspicuous. Propodeal enclosure broadly triangular, depressed deeply, shining, laterally with some slightly broad, longitudinal carinae; propodeal pad with smooth, broad area (Fig. 1G). Posterior surface of propodeum with sturdy reticulation, medially with broad, deep sulcus reaching propodeal enclosure, above sulcus with one or two transverse carinae (Fig. 1I). In profile, dorsal surface of propodeum together with posterior surface nearly arcuate, lateral surface of propodeum with five or six oblique, short rugae (Fig. 1G). Second recurrent vein received by second submarginal cell (Fig. 1A). Hind tibia with row of slender, yellow spines on outer surface, basal half with two rows of spines (Fig. 1B).

***Gaster.*** PL: PW: LT I: WT I: HFL: HTL = 68: 18: 42: 58: 53: 64. Petiole nearly quadrate in cross section, slightly bent upwards basally, slightly widened backwards, width apically 3.8× basally, dorsally completely smooth (Fig. 1A, B). Lateral surface with two conspicuous carinae, shallowly depressed; ventrally flat and with median carina posteriorly (Fig. 1B). Gastral terga densely, finely punctate, base of terga II–IV smooth, impunctate (Fig. 1B). Pygidial plate broadly triangular, 1.5× as long as wide basally, medially with distinct inverted-triangular convexity, shiny and smooth; laterally with one or two rows of coarse, midsize punctures and stiff bristles, coriaceous; apex rounded (Fig. 1J). Sterna laterally with dense, fine punctures, medially smooth and with sparse, fine punctures.

**Male**. Similar to female, but smaller, body length 8.1–8.5 mm. Fore tibiae brown; tarsi, base of hind tibiae, posterior margins of gastral sterna IV–VI, apex of distal sternum yellowish-brown. Gastral sterna III and IV with yellowish-brown fasciculate setae on hind margins (Fig. 2A, B). Clypeal middle lobe with shallow, arcuate emargination, side with two arcuate protrusions (Fig. 2C); HW: HLF: AOD: WAS: IAD = 72: 53: 4: 6: 10; mandible bidentate apically, wide basally: medially: apically = 13: 6: 3.

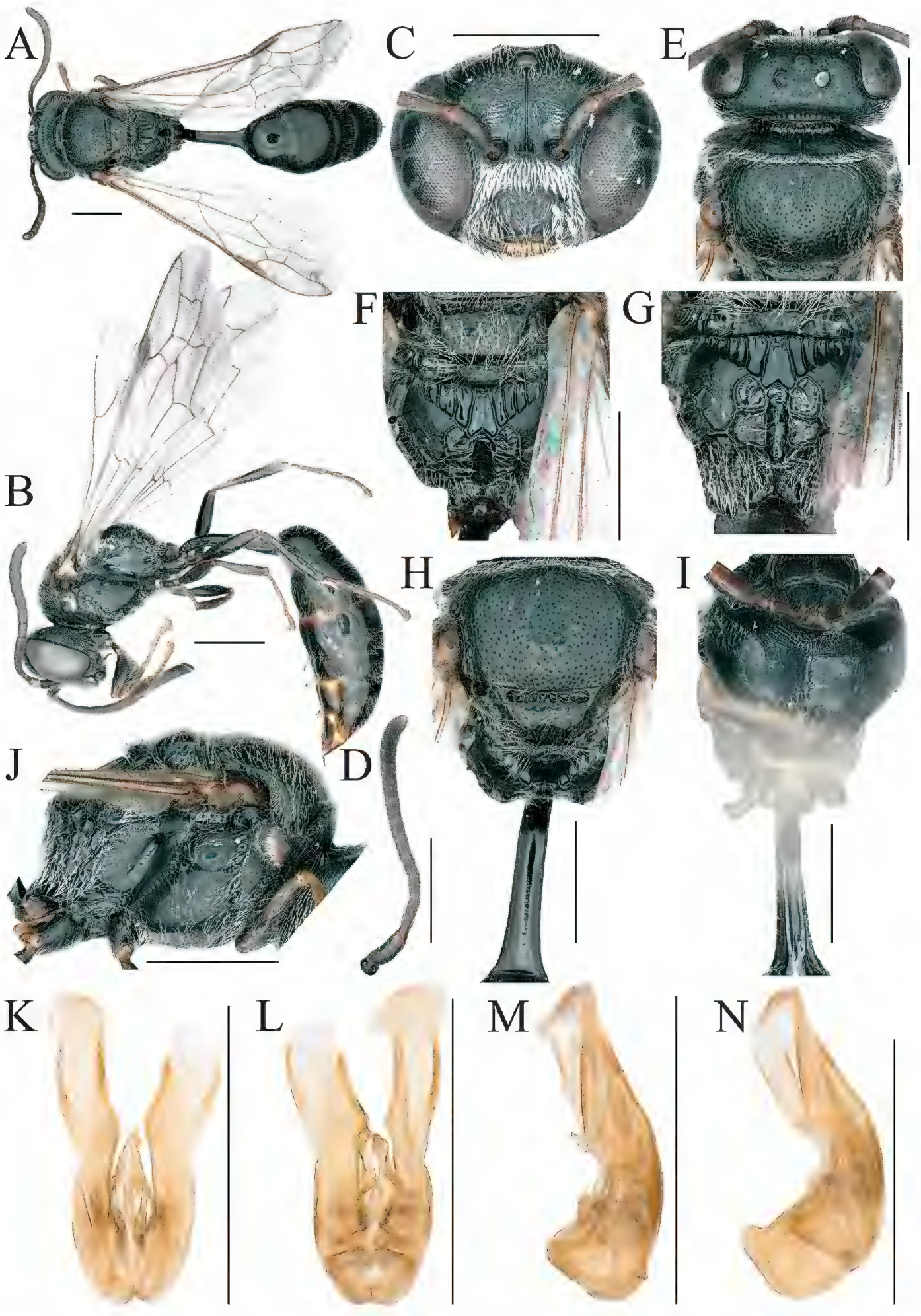


**Figure 2.** *Psen scabristriatus* Deng & Ma, sp. nov. Male. Paratype. **A.** Habitus, dorsal view; **B.** Habitus, lateral view; **C.** Head, frontal view; **D.** Antennae; **E.** Head, pronotum and scutum, dorsal view; **F.** Scutellum, metanotum and propodeum, dorsal view; **G.** Propodeum, posterior view; **H.** Thorax and petiole, dorsal view; **I.** Thorax and petiole, ventral view; **J.** Thorax, lateral view; **K.** Male genitalia, dorsal view; **L.** Male genitalia, ventral view; **M, N.** Male genitalia, lateral view. Scale bar: 1 mm.

Antennae slenderer than in female, flagellomeres beneath without tyloid, relative lengths of articles III–XIII = 13, 9, 8–10, 8, 8, 8–9, 7–8, 7–8, 7, 7–8, 11–12; article III approximately article 2.6× as long as wide apically, article IV about 1.8×, article XII about 1.3×, respectively (Fig. 2D). In dorsal view, behind of postocelli with shallow sulcus (Fig. 2E), HW: HLD: POD: OOD: OCD = 72: 29: 10: 13: 14. PL: PW: LT I: WT I: HFL: HTL = 60: 13: 39: 43: 44: 47, petiole width apically 2× basally, lateral surface deeply depressed (Fig. 2H); ventrally with broad, shallow depression, but without median longitudinal keel (Fig. 2I). Acetabular carina longer than in female, medioventral carina medially with one or two transverse carinae (Fig. 2I). Hind tibia with row of slender, yellow spines on outer surface (Fig. 2B). Basal quarter of tergum II and basal half of terga III–V smooth, impunctate. Genitalia large, yellowish-brown, gonostyle broad and long, inner (or dorsal) half turned into translucent membrane apically, outer (or ventral) margin and apex provided with a fringe of sparse, long setae (Fig. 2K–N). Volsellar digitus flattened, hollowed ventrally, with apex boot-shaped and turned ventrally, inner area slightly produced apically (Fig. 2K–N).

**Distribution.** China (Hunan, Yunnan).

**Etymology.** The specific name is derived from Latin stem *scabri-* (= scabrous) and Latin word *striatus* (= striate), referring to the anterior part of acetabular carina with many striae.

**2. *Psen spinitarsalis* Deng & Ma, sp. nov.**

https://zoobank.org/3B8C3BE9-4976-4DB6-AB2E-CD75C73855A5

Figs 3A–J, 4A–M

**Type material.** ***Holotype.*** China • ♀; Hunan Province, Chenzhou City, Yizhang County, Mangshan Forest Park; 24°57'20.02"N, 112°51'7.49"E; 629 m a.s.l.; 01.X.2004; NO.202005144; sweep net. ***Paratypes.*** 1 ♀, same data as holotype, except NO.202004461; China • 1 ♀; Guangdong Province, Shaoguan City, Nanling Nature Reserve; 24°42'52.57"N, 114°15'46.78"E; 447 m a.s.l.; 08–17.VIII.2010; NO.202003658; malaise trap. China • 6 ♂♂; Guangdong Province, Shaoguan City, Nanling Nature Reserve; 24°42'52.57"N, 114°15'46.78"E; 447 m a.s.l.; 05–07.VI.2010; NO.202004593-202004597, NO.202004593; coll. Zaifu XU; malaise trap. China • 1 ♂; Guangdong Province, Shaoguan City, Nanling Nature Reserve; 24°42'52.57"N, 114°15'46.78"E; 447 m a.s.l.; 17.VII.2008; NO.202004825; coll. Zaifu XU; sweep net. China • 1 ♂; Guangdong Province, Shaoguan City, Nanling Nature Reserve, Chebaling; 24°42'52.57"N, 114°15'46.78"E; 447 m a.s.l.; 22–28.VII.2008; NO.202003656; coll. Zaifu XU; yellow plates. China • 1 ♂; Guizhou Province, Daozhen Gelao Nationality and Miao Nationality Autonomous County, Dashahe National Nature Reserve; 29°7'54.23"N, 107°35'42.65"E; 1365 m a.s.l.; 08.VIII.2004; NO.200707326; coll. Shujun WEI; sweep net. China • 1 ♂; Hubei Province, Yichang City, Changyang County, Hejiaping Town, Qinggangping village; 30°37'51.18"N, 110°54'6.83"E; 1000 m a.s.l.; 03.VII.2012; coll. Hao ZHANG; sweep net. All types deposited in YNAU.

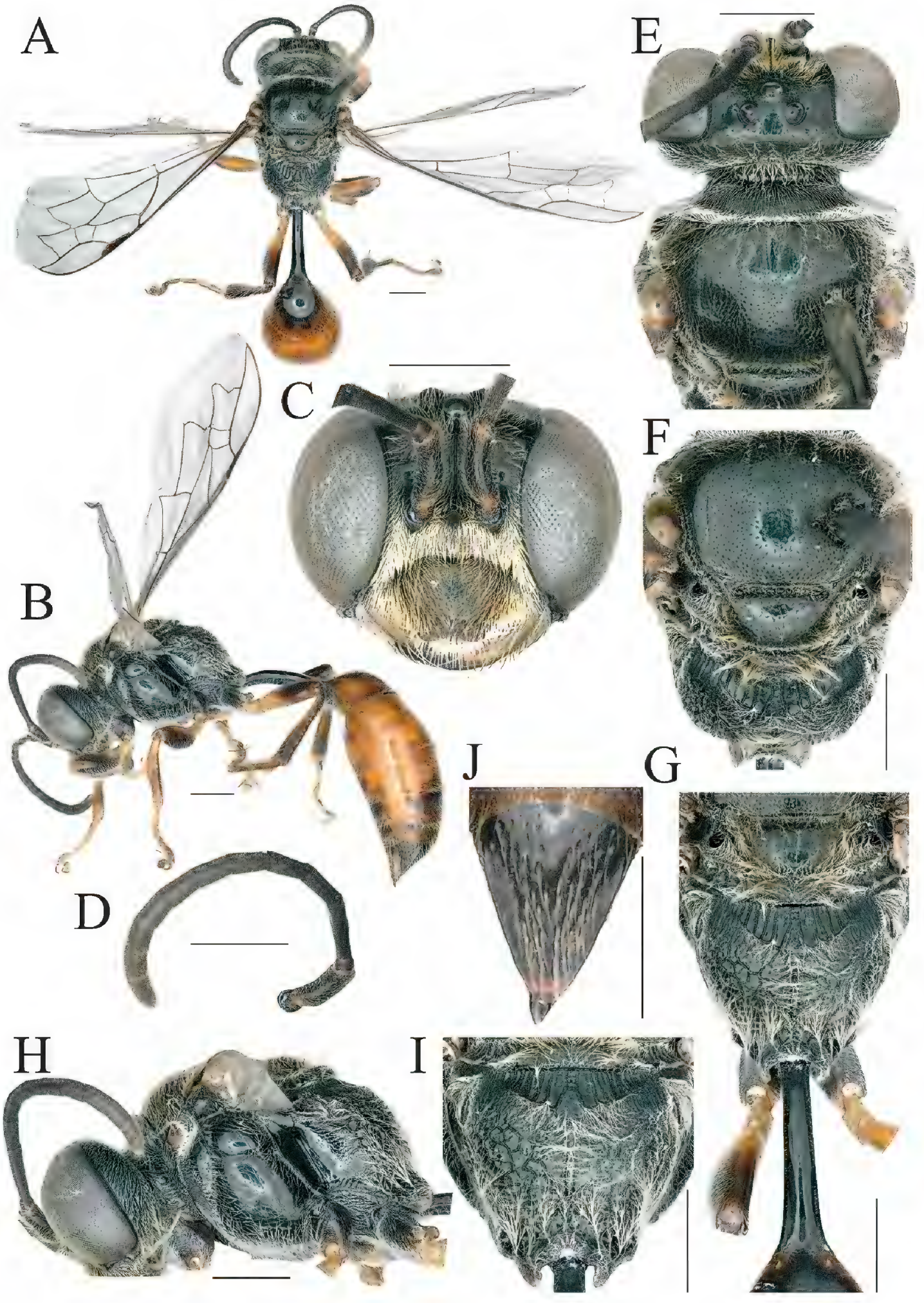


**Figure 3.** *Psen spinitarsalis* Deng & Ma, sp. nov. Female. Holotype. **A.** Habitus, dorsal view; **B.** Habitus, lateral view; **C.** Head, frontal view; **D.** Antennae; **E.** Head and pronotum dorsal view; **F.** Scutum and scutellum, dorsal view; **G.** Metanotum, propodeum and petiole, dorsal view; **H.** Thorax, lateral view; **I.** Propodeum, posterior view; **J.** Pygidial plate, dorsal view. Scale bar: 1 mm.

**Diagnosis.** The new species is similar to *Psen dzimm* Tsuneki, 1959, sharing with it the following: 1) posterior margins of gastral terga I–V with dense, long and gold erect setae; 2) petiole cylindrical in cross section, lateral surface without longitudinal carina or depression; 3) clypeal middle lobe with shallow, arcuate emargination, side with two arcuate protrusions; 4) gastral sterna III–IV with gold fasciculate setae on hind margins in male. It differs from *Psen dzimm* and other congeners by the following characteristics (characters of *P. dzimm* given in parentheses): 1) propodeal enclosure triangular, its marginal ridge inconspicuous and absent on posteriorly lateral half, propodeal pad with dense, slender, oblique longitudinal rugae; lateral surface of propodeum with oblique, short rugae and fine punctures (propodeal enclosure with complete marginal ridge; propodeal pad without longitudinal ruga; lateral surface of propodeum without ruga or puncture); 2) scutum with sparse, tiny punctures anteriorly, remainder with dense, fine to midsize punctures (scutum more grossly, conspicuously, closely punctate); 3) mid basitarsus with row of mid-length spines on externoventral surface, apically with long spine, hind tibia with four or five short thick brownish spines on outer surface in male (mid basitarsus simple, hind tibia without spine); 4) male antennal articles V–XIII beneath with elliptical excavation, article V smaller, and remainder articles larger (articles VI–XIII each with tubercle beneath near base and an excavation near apex); 5) ratio: body smaller, female 12 mm, male 10.7–11.7 mm; HW: HLF: HLD: POD: OOD: OCD = 114: 45: 47: 11: 15: 21 (female 13–14 mm, male 11.5–12 mm; HW: HLF: HLD: POD: OOD: OCD = 85: 35: 34: 10: 12: 15).

**Description. Female.** Body length 12 mm. Black; mandible basally, trochanters, fore tibiae, inner surface of fore and mid femora and tarsi, lateral upper surface of mid femora and tibiae externally, basal half of hind femora and most of hind tibiae yellow. Scape basally and apically and tegulae yellowish brown. Apex of gastral terga I, II–III totally and pygidial plate reddish brown; terga and sterna IV–V with hill shaped yellowish brown stripes. Appressed setae on clypeus gold; frons, vertex, scutum, scutellum and metanotum with appressed gold pubescence and long erect setae; propodeum, and ventral side of petiole with pale yellow pubescence and long setae. Mid-length setae on prepectus, mesopleuron, mesosternum, and trochanters silvery; legs with short, pale yellow pubescence; gaster with very short, gold pubescence. Posterior margins of gastral terga I–V with dense, long, gold erect setae (Fig. 3A, B).

***Head.*** Clypeus with dense, fine punctures, clypeal middle lobe with shallow, arcuate emargination, side with two arcuate protrusions, basal half of clypeal disk moderately convex (Fig. 3C). HW: HLF: AOD: WAS: IAD = 114: 85: 6: 10: 15. Mandible bidentate apically, wide basally: medially: apically = 20: 12: 3. Interantennal tooth conspicuously elevated, apex obtuse or slightly acute; frontal carina conspicuous, extending from median ocellus to apex of interantennal tooth (Fig. 3C). Scape slightly bent, pedicel partially concealed within scape, relative lengths of articles III–XII = 28–29, 19, 17–18, 16–17, 15–16, 15, 13–14, 13–14, 13–14, 21; article III approximately 4× as long as wide apically, article IV about 2.4×, article XII about 2.3×, respectively (Fig. 3D). Frons shiny, with dense, fine punctures, interspaces equal to puncture diameter, on upper part against eyes with an elliptic, slightly raised, almost impunctate arae (Fig. 3C).

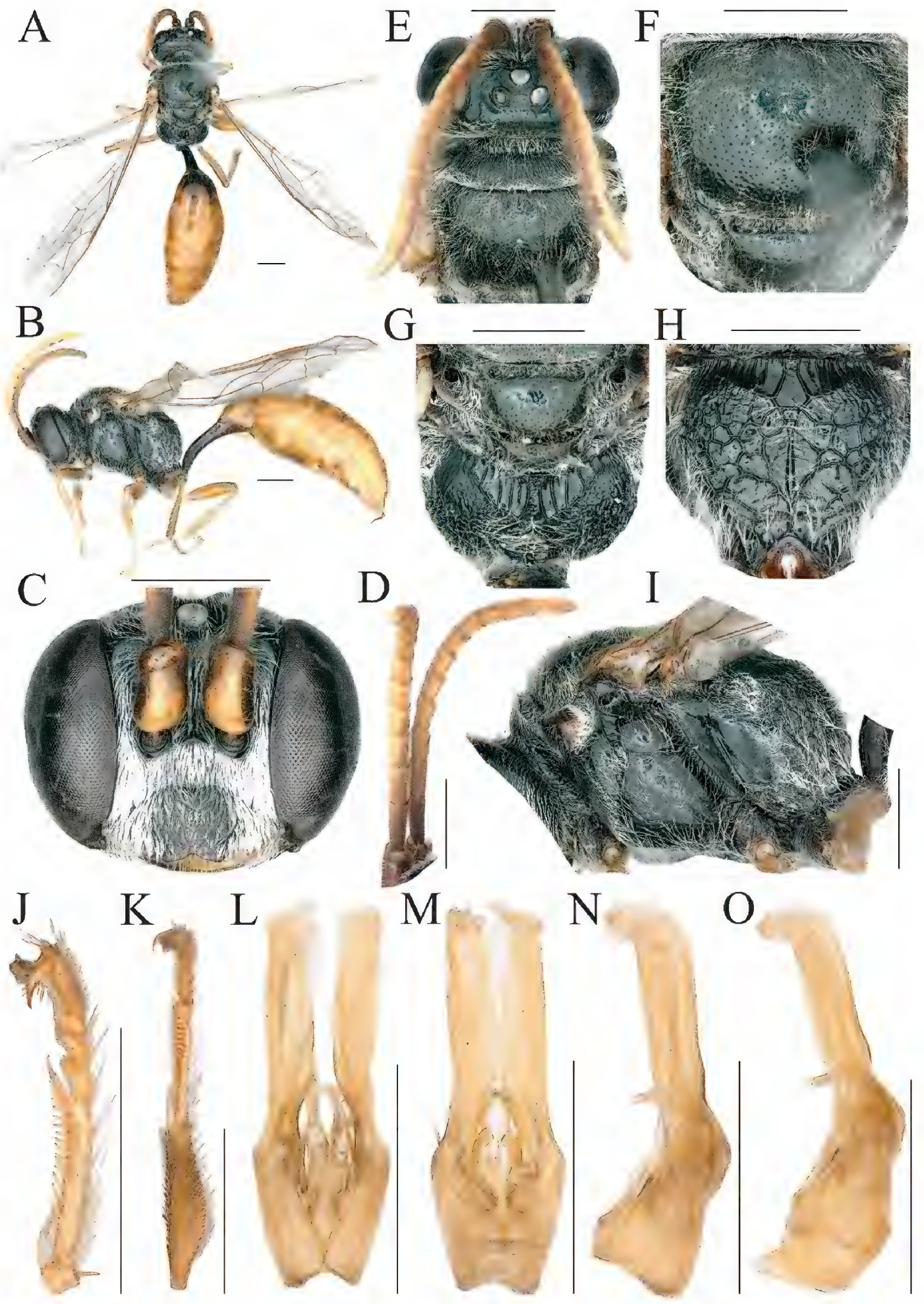


**Figure 4.** *Psen spinitarsalis* Deng & Ma, sp. nov. Male. Paratype. **A.** Habitus, dorsal view; **B.** Habitus, lateral view; **C.** Head, frontal view; **D.** Antennae; **E.** Head and pronotum dorsal view; **F.** Scutum, dorsal view; **G.** Scutellum, metanotum and propodeum, dorsal view; **H.** Propodeum, posterior view; **I.** Thorax, lateral view; **J.** Mid tarsus, lateral view; **K.** Mid tibia and tarsi, ventral view; **L.** Male genitalia, dorsal view; **M.** Male genitalia, ventral view; **N, O.** Male genitalia, lateral view. Scale bar: 1 mm.

Interocellar area and vertex shiny, with sparse, fine punctures, interspaces 4× puncture diameter; hind ocellar posterolaterally with wide smooth and impunctate area; ocellar area not raised, behind postocelli without sulcus, vertex behind postocelli not raised, occipital carina crenulate (Fig. 3E). HW: HLD: POD: OOD: OCD = 114: 47: 11: 15: 21.

***Thorax.*** Scutum with sparse, tiny punctures anteriorly, remainder with dense, fine to midsize punctures, interspaces 2× puncture diameter. Anterior admedian lines slightly expended, backward parallel, parapsidal lines and notauli nearly parallel (Fig. 3F). Scutellum and metanotum with sparse, fine punctures (Fig. 3G). Mesopleuron shiny, with sparse, tiny punctures, posterior margin of mesopleuron with sparse, short striae (Fig. 3H). Metapleura shining, without stria or puncture (Fig. 3H). Mesosternum without acetabular carina, with inconspicuous, longitudinal medioventral carina; medially without transverse carina. Propodeal enclosure broadly triangular, its marginal ridge inconspicuous and absent on posteriorly lateral half, slightly depressed, shining, laterally with some slightly inconspicuous, longitudinal carinae; propodeal pad with dense, slender and oblique longitudinal rugae (Fig. 3G). Posterior surface of propodeum with irregular reticulate ridges reaching propodeal enclosure (Fig. 3I). In profile, dorsal surface of propodeum together with posterior surface nearly arcuate, lateral surface of propodeum with oblique, short rugae, fine punctures (Fig. 3H). Second submarginal cell receiving first recurrent vein at about basally 1/3; second recurrent vein received by third submarginal cell (Fig. 3B). Hind tibia with row of long, thick, brownish spines on outer surface, basally with three rows of spines (Fig. 3B).

***Gaster***. PL: PW: LT I: WT I: HFL: HTL = 84: 15: 69: 77: 80: 90. Petiole cylindrical in cross section, slightly bent upwards basally, slightly widened backwards, width apically 1.8× basally, dorsally smooth (Fig. 3B, G). Lateral surface without carina or depression, and with sparse, tiny punctures (Fig. 3B). Gastral terga sparsely, finely punctate, base of terga III–IV smooth, impunctate. Pygidial plate broadly triangular, 1.5× as long as wide basally, medially with small inverted-triangular convexity, shiny and smooth, remainder with coriaceous sculpture, dense, fine to midsize punctures and stiff bristles, apex rounded (Fig. 3J).

**Male.** Similar to female, but smaller, body length 10.7–11.7 mm. Antennae beneath yellow, above yellowish brown; legs and gaster except first gastral segment almost yellow. Gastral sterna III and IV with gold fasciculate setae on hind margins. Appressed setae on clypeus silvery; frons, vertex, scutum, scutellum and metanotum with appressed pale yellow pubescence and long erect setae; mid-length setae on prepectus, mesopleuron, trochanters, propodeum, and ventral side of petiole silvery; gaster with dense, short, golden pubescence (Fig. 4A, B). Antennal articles V–XIII beneath with elliptical excavations, article V smaller, remaining articles larger; relative lengths of articles III–XIII = 20–23, 16–17, 15, 13–15, 13, 13–15, 13–14, 13, 12–13, 12–13, 18; article III approximately article 2.5–2.9× as long as wide apically, article IV about 1.8×, article XII about 1.4×, respectively (Fig. 4D). In front view, HW: HLF: AOD: WAS: IAD = 83: 60: 5: 7: 10; in dorsal view, HW: HLD: POD: OOD: OCD = 94: 72: 11: 14: 19. Lateral basal 1/3 of mid tibia significantly widened and base of mid basitarsus with row of mid-length spines on externoventral surface and apically with

long spine; hind tibia with four or five short, thick, brownish spines on outer surface (Fig. 4J, K). PL: PW: LT I: WT I: HFL: HTL = 66: 13: 60: 67: 67: 77. Genitalia large, yellowish-brown, upper part lighter than basally, gonostyle slender, long, inner (or dorsal) narrow margin with translucent membrane apically, outer (or ventral) margin and apex provided with fringe of sparse, long setae (Fig. 4L–O). Volsellar digitus flattened, hollowed ventrally, with apex subquadrate and turned ventrally (Fig. 4L–O).

**Distribution.** China (Hubei, Hunan, Guangdong, Guizhou).

**Etymology.** The specific name is derived from Latin stem: *spini* - (= spinulate) and Latin word -*tarsalis* (= tarsal), referring to the basal mid tarsomere with row of mid-length spines on externoventral surface and apically with long spine (Fig. 4J, K).

### 3. *Psen rhyssothoracicus* Deng & Ma, sp. nov.

https://zoobank.org/15498A81-B5C5-45E4-A3CE-067D07BDC543

Figs 5A–J, 6A–M

**Type material.** ***Holotype.*** China • ♀; Tibet, Shigatse, Yadong County; 27°37'7.18"N, 88°55'49"E; 3591 m a.s.l.; 25.VII.2018; coll. Shijie DU. ***Paratypes.*** 39 ♀♀ 16 ♂♂, same data as holotype. All types deposited in YNAU.

**Diagnosis.** The new species is similar to *Psen seminitidus* van Lith, 1965 sharing with it the following: 1) frons, interocellar area, and vertex medially with dense, fine punctures; scutum with dense, midsize to large punctures; mesopleuron and metanotum with sparse, tiny punctures; 2) petiole with median keel ventrally; 3) pygidial plate narrowly triangular, shiny, laterally with one row of sparse, fine punctures, apex truncate, basally slightly concave; 4) gastral sternum IV with dark brown fasciculate setae on hind margin in male. It differs from *Psen seminitidus* and other congeners by the following characteristics (characters of *P. seminitidus* given in parentheses): 1) propodeal pad with dense, slender, oblique longitudinal rugae (with narrow and smooth area); 2) lateral surface of propodeum with oblique, short rugae and fine punctures (with sparse, tiny punctures, without ruga); 3) male antennal articles IV–VII beneath with linear tyloids (articles V–VI or V–VII beneath with linear tyloids); 4) ratio: PL: PW: LT I: WT I: HFL: HTL = 80: 13: 41: 45: 62: 75 in female (PL: PW: LT I: WT I: HFL: HTL = 59: 11: 41: 50: 60: 70).

**Description. Female.** Body length 9.7–12.0 mm. Black; mandible apically reddish brown; wing veins and claws dark brown. Appressed setae on clypeus silvery; vertex and scutum with appressed long, dense, pale brown pubescence; mesopleuron, legs, propodeum and petiole with dense, long, silvery pubescence (Fig. 5A, B).

***Head.*** Clypeus with dense, fine punctures, clypeal middle lobe with shallow, arcuate emargination, side with two square teeth, basal half of clypeal disk moderately elevated (Fig. 5C). HW: HLF: AOD: WAS: IAD = 90: 71: 6: 8: 12. Mandible bidentate apically, broad and blunt, wide basally: medially: apically = 19: 9: 5. Interantennal tooth moderately elevated, apex slightly acute; frontal carina complete, inconspicuous, extending from median ocellus to apex of interantennal tooth (Fig. 5C). Scape slightly bent, pedicel

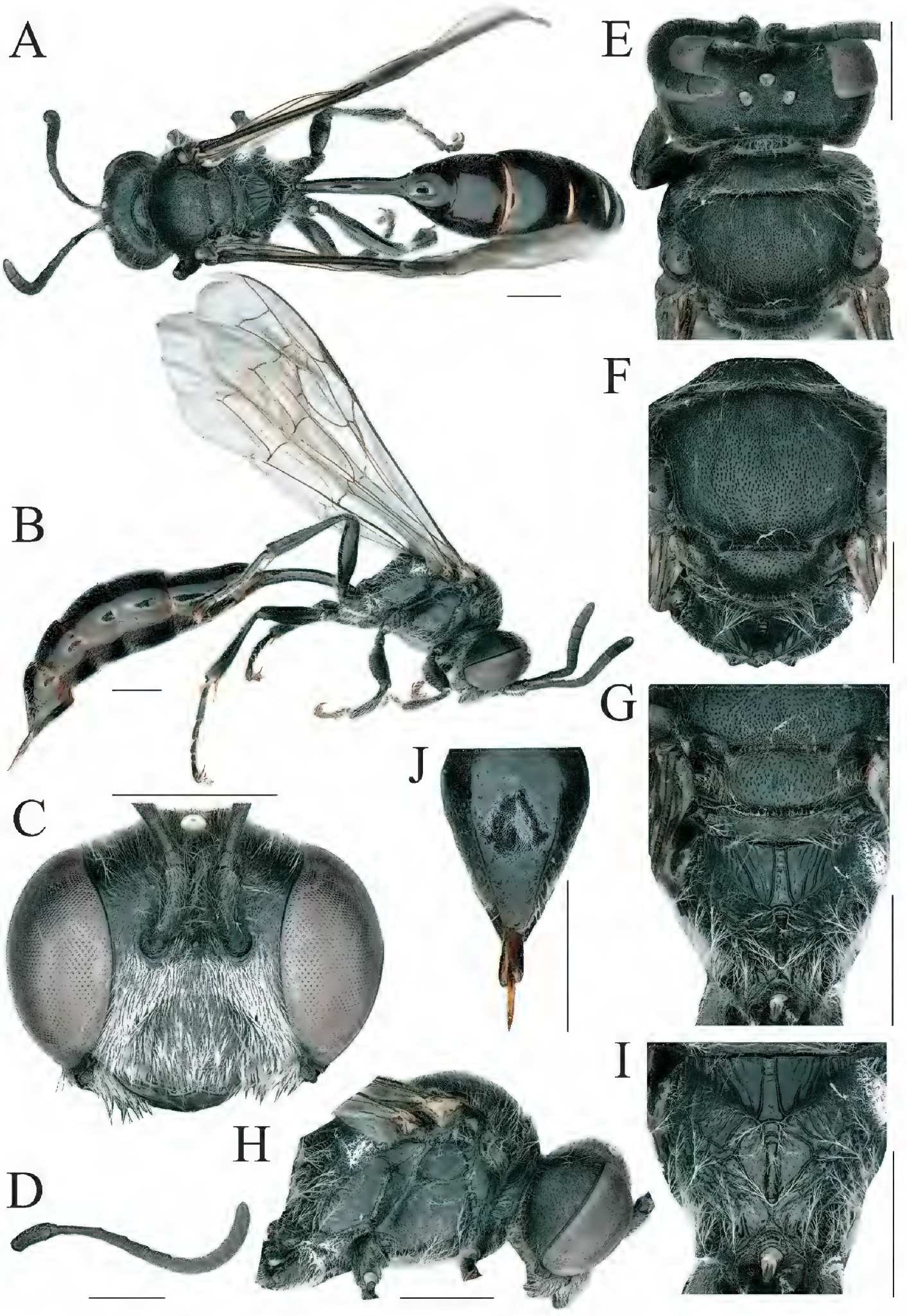


**Figure 5.** *Psen rhyssothoracicus* Deng & Ma, sp. nov. Female. Holotype. **A.** Habitus, dorsal view; **B.** Habitus, lateral view; **C.** Head, frontal view; **D.** Antennae; **E.** Head and pronotum dorsal view; **F.** Scutum, dorsal view; **G.** Scutellum, metanotum and propodeum, dorsal view; **H.** Thorax, lateral view; **I.** Propodeum, posterior view; **J.** Pygidial plate, dorsal view. Scale bar: 1 mm.

partially concealed within scape, relative lengths of articles III–XII = 20–25, 13–14, 13–14, 12–13, 11–12, 10–11, 10, 10, 10, 14; article III approximately 3.3–4.2× as long as wide apically, article IV about 1.8–2.0×, article XII about 1.4×, respectively (Fig. 5D). Frons, interocellar area and vertex medially with dense, fine punctures, interspaces less than puncture diameter; lateral ocellar area and vertex with sparse, fine punctures, interspaces equal to or slightly larger than puncture diameter (Fig. 5C). Ocellar area moderately raised, area between ocelli with shallow, longitudinal sulcus, behind postocelli without transverse sulcus, vertex behind postocelli not raised, occipital carina smooth (Fig. 5E). HW: HLD: POD: OOD: OCD = 90: 35: 12: 15: 17.

***Thorax***. Scutum with dense, fine to midsize punctures, interspaces 1–2× puncture diameter. Anterior admedian lines slightly expanded, backward parallel, parapsidal lines and notauli nearly parallel (Fig. 5F). Scutellum with dense, midsize punctures, interspaces equal to or larger than puncture diameter, metanotum with sparse, tiny to fine punctures (Fig. 5G). Mesopleuron shiny, with sparse, tiny punctures, posteriorly with sparse, inconspicuous longitudinal striae (Fig. 5H). Mesosternum with short acetabular carina, longitudinal medioventral carina slightly conspicuous, medially with many transverse carinae. Propodeal enclosure broadly semicircular, slightly depressed, shining, laterally with some slightly inconspicuous, longitudinal carinae; propodeal pad with dense, slender, oblique longitudinal rugae (Fig. 5G). Posterior surface of propodeum with irregular, slightly conspicuous reticulate ridges reaching propodeal enclosure, medially with deep sulcus reaching enclosed area, above sulcus with two or three transverse carinae (Fig. 5I). In profile, dorsal surface of propodeum together with posterior surface nearly obtuse angle, lateral surface of propodeum with slightly dense, tiny punctures, upper with oblique, short rugae (Fig. 5H). Second recurrent vein received by second submarginal cell near apically (Fig. 5B). Hind tibia with row of long thick, pale yellow spines on outer surface.

***Gaster***. PL: PW: LT I: WT I: HFL: HTL = 80: 13: 41: 45: 62: 75. Petiole nearly quadrate in cross section, slightly bent upwards basally, slightly widened backwards, width apically 1.5× basally, dorsally completely smooth (Fig. 5A). Lateral surface with two conspicuous carinae, shallowly depressed (Fig. 5B); ventrally with slightly conspicuous median keel, laterally with dense, tiny punctures. Gaster shiny, terga with sparse, tiny punctures (Fig. 5A, B). Pygidial plate narrowly triangular, shiny, 1.8–2.1× as long as wide basally, laterally with one row of sparse and fine punctures, apex truncate, basally slightly concave (Fig. 5J).

**Male.** Similar to female, but slender and smaller, body length 9.2–10.8 mm. Gastral sternum IV with dark brown fasciculate setae on hind margin (Fig. 6B). Antennae slenderer than in female, pedicel partially concealed within scape; antennal articles IV–VII beneath with linear tyloids, articles IV and VII shorter, articles V–VI longer; relative lengths of articles III–XIII = 20–25, 18–20, 17–18, 16–18, 16–18, 15–17, 15–17, 15–17, 15–17, 15–16, 19–21; article III approximately 2.5–3.1× as long as wide apically, article IV about 2.0–2.2×, article XII about 1.9×, respectively (Fig. 6D). In front view, HW: HLF: AOD: WAS: IAD = 83: 60: 5: 7: 10; in dorsal view, HW: HLD: POD: OOD: OCD = 83: 31: 10: 14: 13. Hind tibia with four or five short, thick,

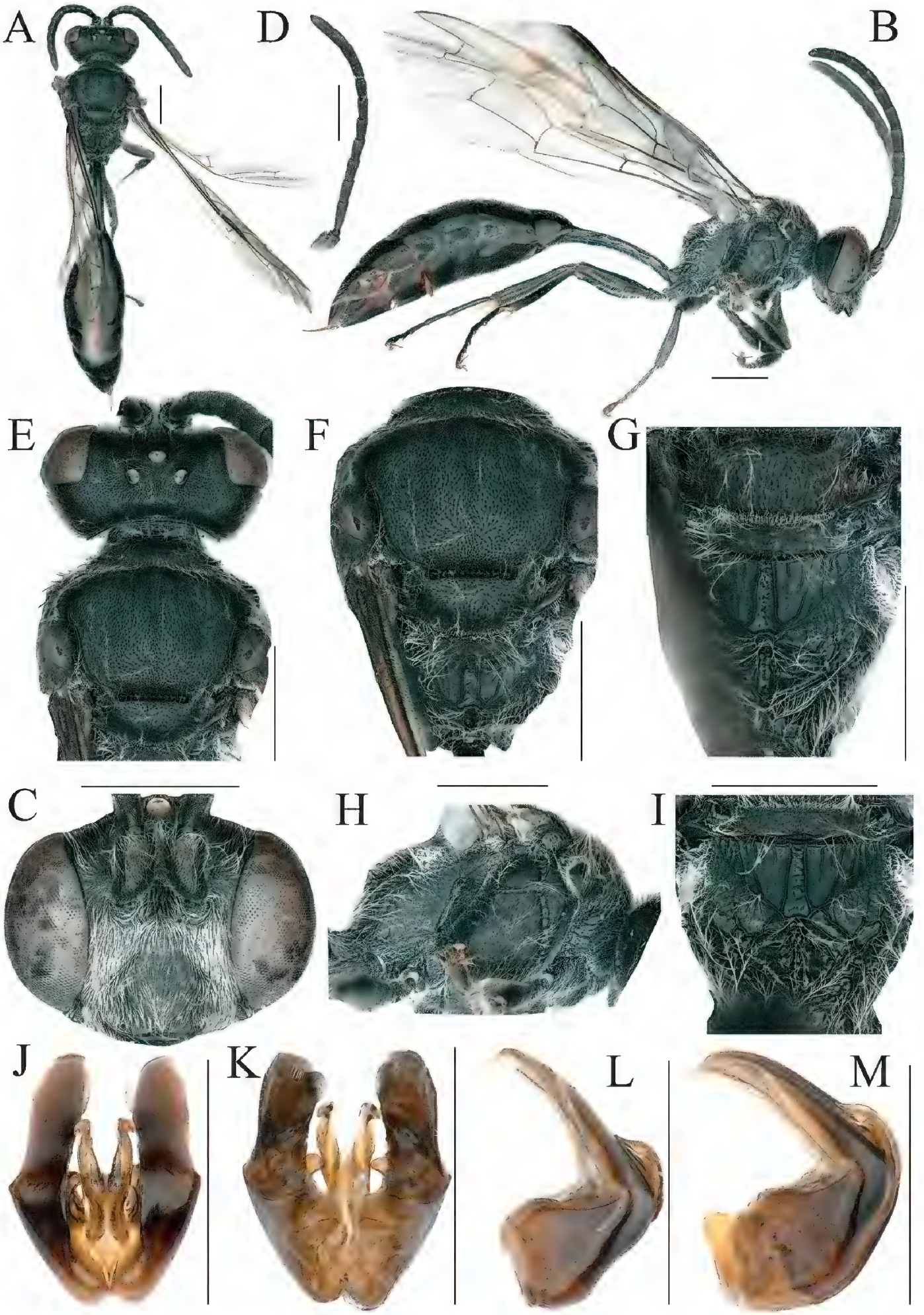


**Figure 6.** *Psen rhyssothoracicus* Deng & Ma, sp. nov. Male. Paratype. **A.** Habitus, dorsal view; **B.** Habitus, lateral view; **C.** Head, frontal view; **D.** Antennae; **E.** Head and pronotum dorsal view; **F.** Scutum and scutellum, dorsal view; **G.** Metanotum and propodeum, dorsal view; **H.** Thorax, lateral view; **I.** Propodeum, posterior view; **J.** Male genitalia, dorsal view; **K.** Male genitalia, ventral view; **L, M.** Male genitalia, lateral view. Scale bar: 1 mm.

brownish spines on outer surface. Venter of petiole with median keel medially and posteriorly, PL: PW: LT I: WT I: HFL: HTL = 68: 12: 36: 40: 56: 68. Genitalia large, dark brown, gonostyle broad and long, inner (or dorsal) margin of apical portion with narrow translucent membrane apically, outer (or ventral) margin and apex provided with fringe of sparse, long setae (Fig. 6J–M). Volsellar digitus flattened, hollowed ventrally, with apex round and turned ventrally, inner area slightly produced apically (Fig. 6J–M).

**Distribution.** China (Tibet).

**Etymology.** The specific name is derived from Greek stem: *rhyss* - (= rugose) and Greek word *thoracicus* (= thoracic), referring to the propodeum with some longitudinal carinae and sturdy reticulation.

### 4. *Psen brinchangensis* van Lith, 1965

Figs 7A–J, 8A–M

**Specimens examined.** China • 1 ♀; Yunnan Province, Xishuangbanna Autonomous Prefecture, Menghai County, Blangshan Township; 21°4'4.8"N, 100°26'37.62"E; 1677 m a.s.l.; 13.VIII–15.IX 2020; NO.202101554; malaise trap. China • 1 ♀; Yunnan Province, Xishuangbanna Autonomous Prefecture, Menghai County, Blangshan Township; 21°45'4.8"N, 100°26'37.62"E; 1677 m a.s.l.; 16.VII–16.VIII.2021; NO.202105343; malaise trap. China • 1 ♀; Yunnan Province, Xishuangbanna Autonomous Prefecture, Menghai County, Blangshan Township; 21°44'29.88"N, 100°26'53.34"E; 1659 m a.s.l.; 21.VIII–20.IX.2019; NO.2019010395; malaise trap. China • 1 ♀; Yunnan Province, Xishuangbanna Autonomous Prefecture, Menghai County, Guanggang village; 21°49'49.9"N, 100°28'20.04"E; 1229 m a.s.l.; 15.IX–23.X.2020; NO.202102250; malaise trap. China • 1 ♀; Yunnan Province, Xishuangbanna Autonomous Prefecture, Menghai County, Blangshan Township; 21°45'4.8"N, 100°26'37.62"E; 1677 m a.s.l.; 15.IX–15. X.2021; NO.202105550; malaise trap. China • 1 ♂; Yunnan Province, Xishuangbanna Autonomous Prefecture, Menghai County, Blangshan Township; 21°44'31.26"N, 100°26'38.9"E, 1646 m a.s.l.; 20.VII–16.VIII.2018; NO.2019000409; malaise trap. China • 1 ♂; Yunnan Province, Xishuangbanna Autonomous Prefecture, Menghai County, Blangshan Township; 21°44'31.26"N, 100°26'38.9"E, 1646 m a.s.l., 19.IV–28.V.2019; NO.2019005958; malaise trap. China • 5 ♂♂; Yunnan Province, Xishuangbanna Autonomous Prefecture, Menghai County, Blangshan Township; 21°44'31.26"N, 100°26'38.9"E; 1646 m a.s.l.; 12.VIII–15.IX.2020; NO.202100968-202100969, NO.202100980-202100981, NO.202102116; malaise trap. All types deposited in YNAU.

**Description. Male** (first description). Body length 8.1–8.2 mm. Mandible basally, trochanters, inner surface of fore and mid femora and tarsi, most of hind femora, gastral terga I–II and sternum II reddish brown or yellowish brown. Antennae flagellomeres beneath, outer surface of fore and mid femora and mid tibiae, hind tibiae and tarsi yellowish brown. Gastral sterna III–VI dark brown. Appressed setae on clypeus

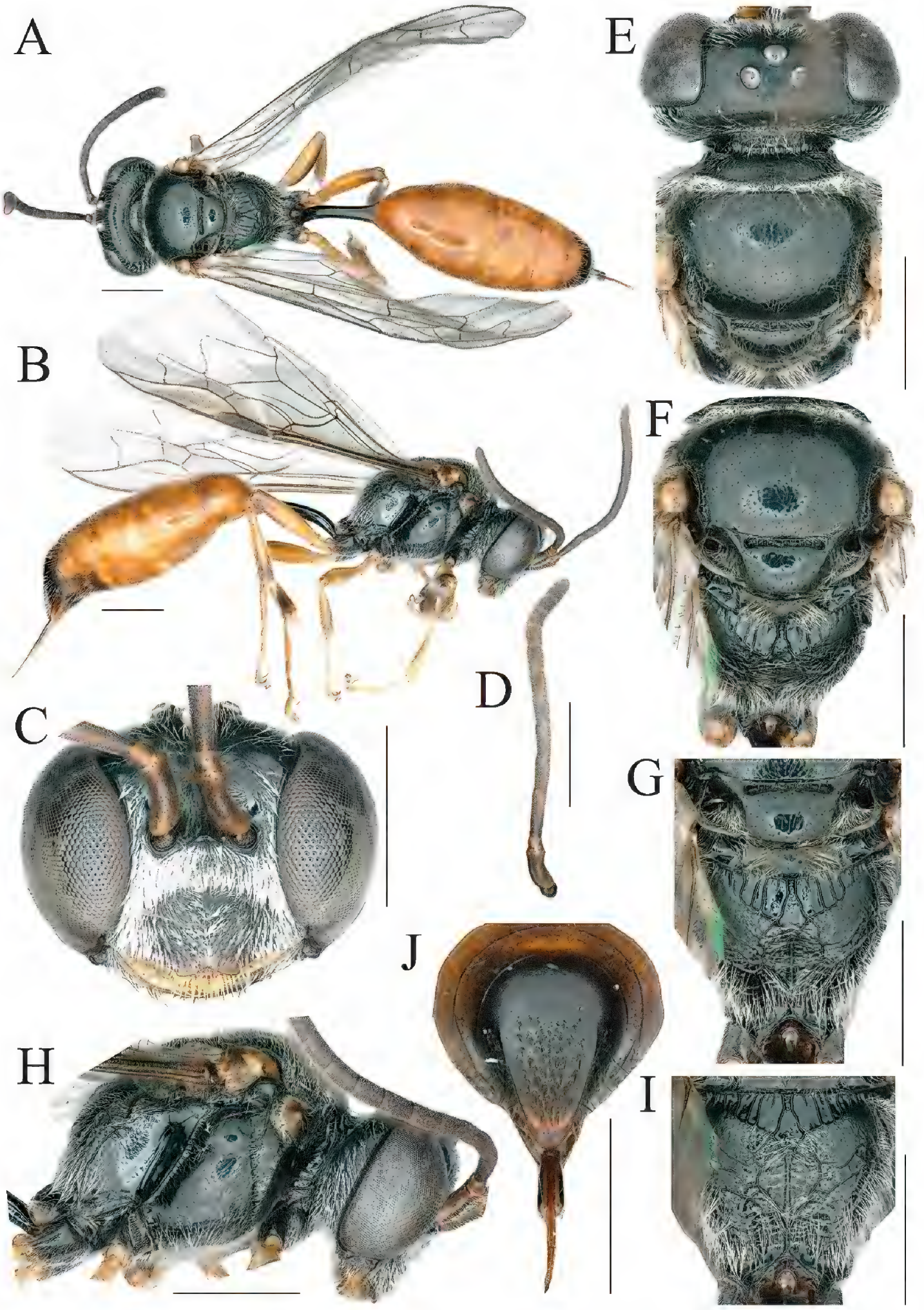


**Figure 7.** *Psen brinchangensis* van Lith, 1965. Female. **A.** Habitus, dorsal view; **B.** Habitus, lateral view; **C.** Head, frontal view; **D.** Antennae; **E.** Head, pronotum and scutum, dorsal view; **F.** Scutellum and metanotum, dorsal view; **G.** Propodeum, dorsal view; **H.** Thorax, lateral view; **I.** Propodeum, posterior view; **J.** Pygidial plate, dorsal view. Scale bar: 1 mm.

silvery; frons, vertex, scutum, scutellum and metanotum with appressed pale yellow pubescence and long erect setae. Mid-length setae on mesopleuron, mesosternum, propodeum, ventral side of petiole, and legs silvery. Gastral sterna III and IV with gold fasciculate setae on hind margins. Posterior margins of gastral terga I–V with dense, long, gold erect setae. (Fig. 8A, B)

***Head***. Clypeus with dense, fine punctures, clypeal middle lobe with shallow, arcuate emargination, side with two obtuse teeth, basal half of clypeal disk moderately convex (Fig. 8C). HW: HLF: AOD: WAS: IAD = 72: 56: 5: 7: 11. Mandible bidentate apically, width basally: medially: apically = 9: 5: 2. Interantennal tooth moderately elevated, apex acute; frontal carina conspicuous, extending from median ocellus to apex of interantennal tooth (Fig. 8C). Scape slightly bent, pedicel partially concealed within scape, antennal articles V–XIII beneath with elliptical excavation, articles V and XIII smaller, and remaining articles larger; relative lengths of articles III–XIII = 15, 10, 10, 11, 11, 11, 10, 10, 10, 10, 15; article III approximately 2.5× as long as wide apically, article IV about 1.7×, article XII about 1.3×, respectively (Fig. 8D). Frons shiny, with sparse, tiny punctures (Fig. 8C). Interocellar area and vertex shiny, with sparse, tiny punctures; ocellar area not raised, behind postocelli without sulcus, vertex behind postocelli not raised, occipital carina inconspicuous, crenulate (Fig. 8E). HW: HLD: POD: OOD: OCD = 72: 31: 11: 12: 15.

***Thorax***. Scutum with sparse, tiny to fine punctures, interspaces 2–4× puncture diameter. Admedian lines, parapsidal lines and notauli nearly parallel (Fig. 8F). Scutellum and metanotum with sparse, fine punctures (Fig. 8G). Mesopleuron shiny, with sparse, tiny punctures, posterior margin of mesopleuron with sparse, short striae. Metapleura shining, without stria or puncture (Fig. 8H). Mesosternum without acetabular carina, longitudinal medioventral carina conspicuous, medially with many transverse carinae. Propodeal enclosure broadly triangular, its marginal ridge conspicuous posteriorly, gradually weakening anterolaterally, inner area slightly depressed, shining, laterally with some inconspicuous longitudinal carinae; propodeal pad with sparse, inconspicuous, irregular rugae (Fig. 8G). Posterior surface of propodeum with irregular reticulate ridges reaching propodeal enclosure (Fig. 8I). In profile, dorsal surface of propodeum together with posterior of surface nearly arcuate, dorsolaterally surface of propodeum with oblique, short rugae and fine punctures (Fig. 8H). Second recurrent vein received by third submarginal cell basally (Fig. 8B). Hind tibia with five or six short, thick, yellowish brown spines on outer surface.

***Gaster***. PL: PW: LT I: WT I: HFL: HTL = 57: 8: 44: 46: 47: 50. Petiole cylindrical in cross section, slightly bent upwards basally, slightly widened backwards, width apically 1.8× basally, dorsally smooth (Fig. 8A). Lateral surface without carina and depression, with sparse, tiny punctures (Fig. 8B). Gaster shiny, with sparse, tiny to fine punctures, base of terga II–IV smooth, impunctate (Fig. 8B). Genitalia large, yellowish-brown, gonostyle slender and long, inner (or dorsal) margin with narrow translucent membrane apically, outer (or ventral) and inner (or dorsal) margin with sparse, long setae (Fig. 8J–M). Volsellar digitus flattened, hollowed ventrally, with apex round and turned ventrally, inner area slightly produced apically (Fig. 8J–M).

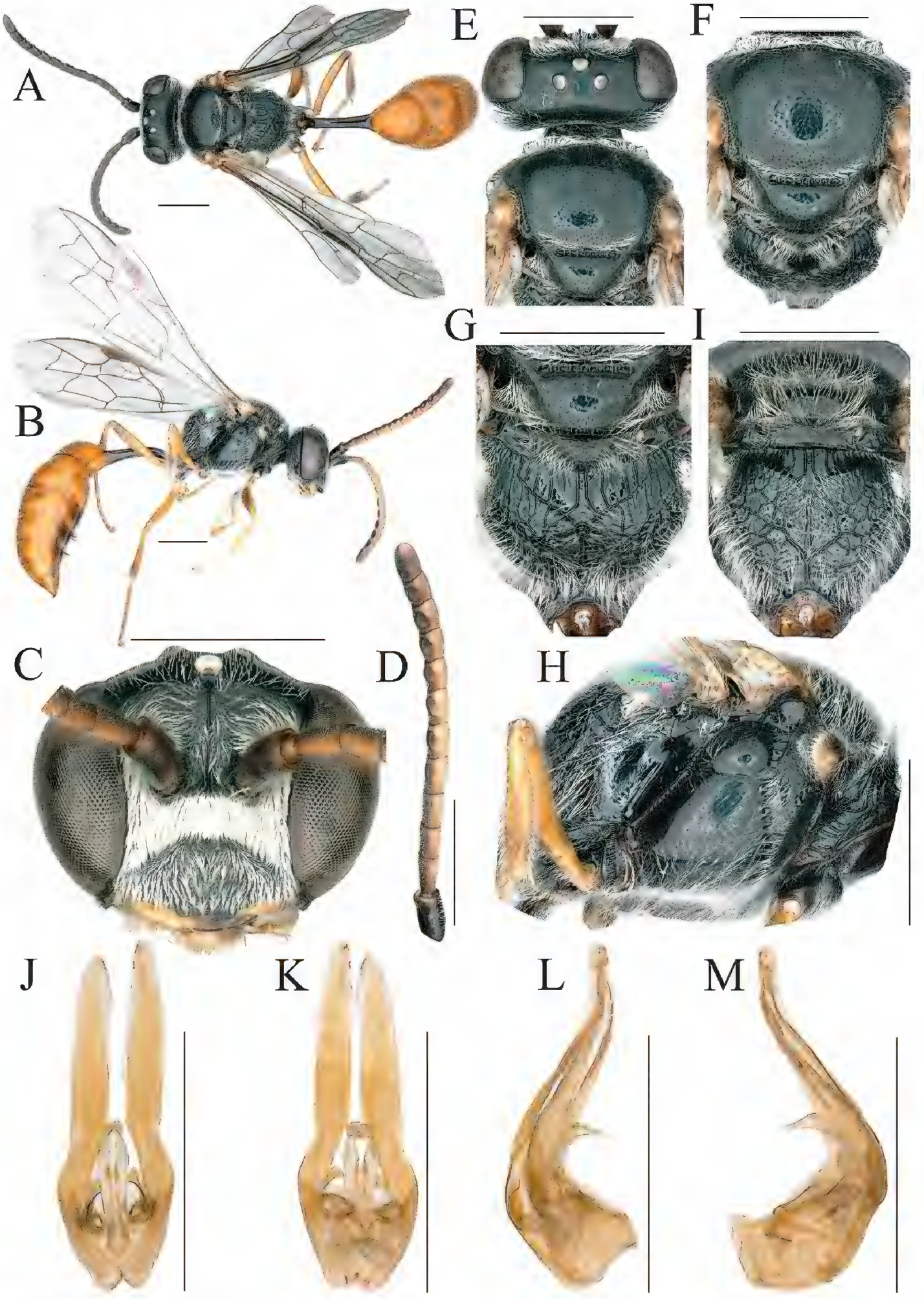


**Figure 8.** *Psen brinchangensis* van Lith, 1965. Male. **A.** Habitus, dorsal view; **B.** Habitus, lateral view; **C.** Head, frontal view; **D.** Antennae; **E.** Head, pronotum and scutum, dorsal view; **F.** Scutum and scutellum, dorsal view; **G.** Scutellum, metanotum and propodeum, dorsal view; **H.** Thorax, lateral view; **I.** Propodeum, posterior view; **J.** Male genitalia, dorsal view; **K.** Male genitalia, ventral view; **L, M.** Male genitalia, lateral view. Scale bar: 1 mm.

**Female supplement characteristics.** In front view, HW: HLF: AOD: WAS: IAD = 84: 65: 5: 7: 11; antennae relative lengths of articles III–XII = 19–20, 12–14, 12–13, 12–13, 11–12, 12, 11, 10–11, 10–11, 15–16; article III approximately 2.8× as long as wide apically, article IV about 1.7–2×, article XII about 2.1–2.3×, respectively. In dorsal view, HW: HLD: POD: OOD: OCD = 84: 35: 10: 12: 15. Mesosternum with inconspicuous longitudinal medioventral carina; medially with two or three transverse carinae. PL: PW: LT I: WT I: HFL: HTL = 60: 9: 48: 54: 56: 65.

**Distribution.** China (Yunnan); Malaysia. First record from China.

In China, 32 species and six subspecies have been documented, we have made a distribution map of *Psen* species in China (Fig. 9).

## Discussion

*Psen* is the second-largest genus in the tribe Psenini, comprising 95 species and 22 subspecies with a broad distribution across all six major zoogeographic regions of the world. In China, 28 species and six subspecies have been documented. Three provinces show particularly high diversity: Taiwan (14 species and two subspecies), Zhejiang (11 species), and Yunnan (10 species). Most other Provinces, with the exception of Sichuan (seven species), host only one to three species, reflecting a distribution pattern concentrated in eastern, southeastern, and southwestern China. Of the Chinese *Psen* species, 14 are restricted to the Oriental Region, 10 to the Palearctic Region, and 10 occur in both, spanning nearly 27 degrees of latitude (18.7°–45.6°N). This wide range suggests that the genus occupies a transitional zone between the Palearctic and Oriental Regions, with a slight preference for the latter. In terms of topography, *Psen* species richness generally increases from west to east. Most species are concentrated in the south-central parts of China's second and third terrain steps. Only two species, *P. fuscinervis* and *P. seminitidus*, have been recorded in the first step, typically at higher elevations (Fig. 9).

Among the *Psen* species known in China, 15 species and 2 subspecies are endemic, accounting for 15.4% of the genus's global diversity. This highlights China's unique zoogeographic position and its exceptionally high environmental heterogeneity, which together create a wide array of habitat types that support remarkable insect biodiversity. Although *Psen* is a globally distributed genus, its species are non-migratory and exhibit low overlap across geographic regions. Most species have distinct, localized distributions.

Three new species *Psen scabristriatus*, *P. spinitarsalis*, and *P. rhyssothoracicus* and first recorded *P. brinchangensis* from China were described in this study. The first two new species occur in both the Oriental and Palearctic Regions. In contrast, *P. rhyssothoracicus* is a typical Palearctic species, found at elevations above 3500 m. *P. rhyssothoracicus* is notable for its relatively large and slender body, with a uniformly black, coriaceous surface. Its morphological traits are highly stable.

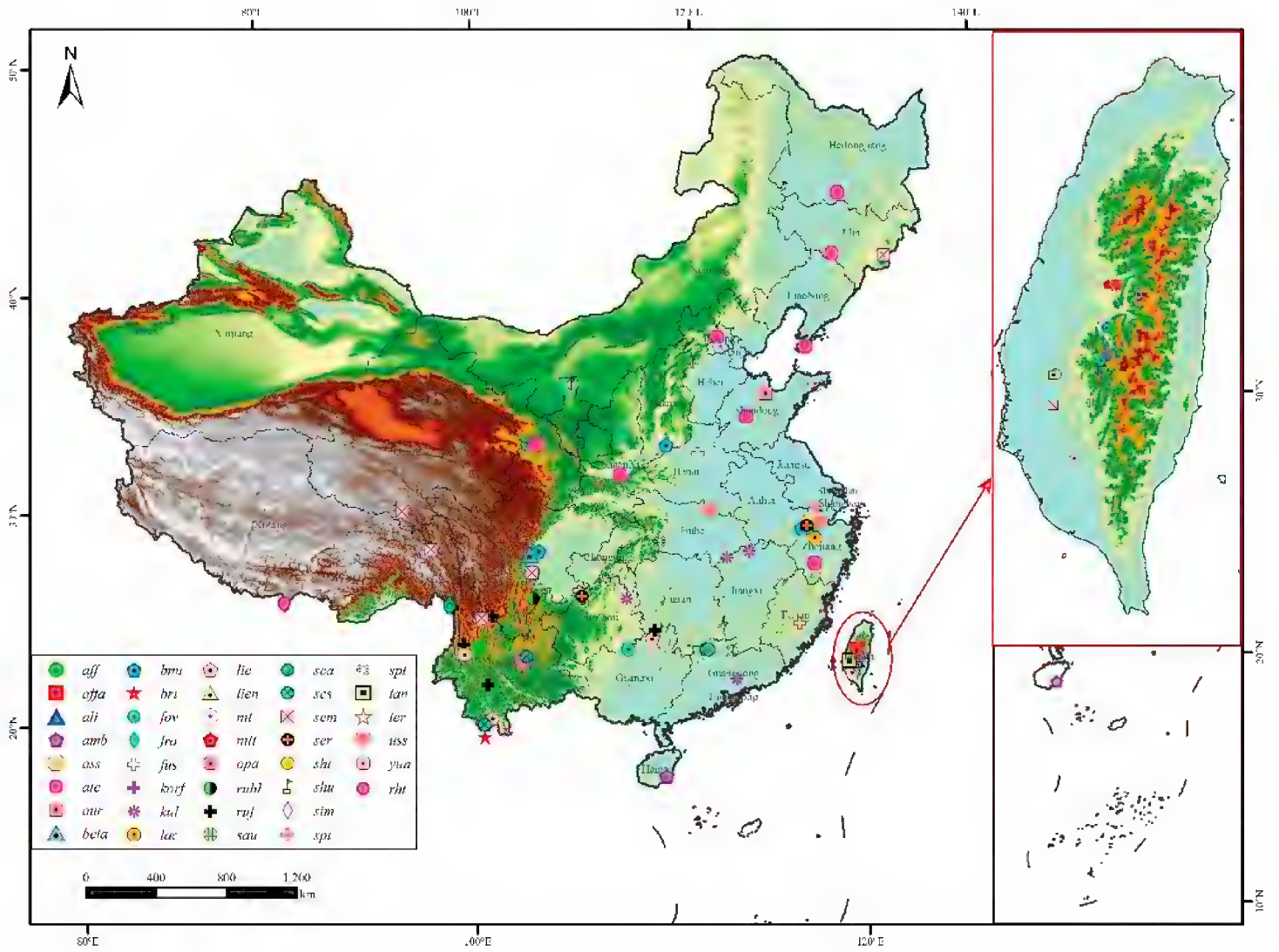


**Figure 9.** Distribution of *Psen* from China (the species abbreviation in the map representing the following species: *aff* = *affinis*, *affa* = *affinis atayal*, *ali* = *alishanus*, *amb* = *amboinensis*, *ass* = *assamensis*, *ate* = *ater*, *aur* = *aurifrons*, *beta* = *betton attenuatus*, *bnu* = *bnun*, *bri* = *brinchangensis*, *fro* = *fronistriatus*, *fov* = *foveicornis*, *fus* = *fuscinervis*, *korf* = *koreanus formosensis*, *kul* = *kulingensis*, *lac* = *lacuniventris*, *lie* = *lieftincki*, *lien* = *lieftincki nigripennis*, *nit* = *nitidus*, *nitt* = *nitidus takasago*, *opa* = *opacus*, *rubl* = *rubicundus lawuensis*, *ruf* = *rufoannulatus*, *sau* = *sauteri*, *sca* = *scabrosus*, *scs* = *scabristriatus*, *sem* = *seminitidus*, *ser* = *seriatispinosus*, *shi* = *shirozui*, *shu* = *shukuzanus*, *sim* = *simlensis*, *spi* = *spinitibialis*, *spt* = *spinitarsalis*, *tan* = *tanoi*, *ter* = *terayamai*, *uss* = *ussuriensis*, *yun* = *yunnanensis*, *rht* = *rhyssothoracicus*).

Dissection of the male genitalia revealed consistent coloration and structural features, as shown in Fig. 6J–M. We hypothesize that these characteristics are adaptations to the high-altitude environment. Insects inhabiting high latitudes or elevations often exhibit darker body coloration, which enhances heat absorption compared to lighter ones (Xing et al. 2018; de Souza et al. 2020). Furthermore, the dark pigmentation may indicate a high melanin content in the cuticle, which can protect against the increased levels of UV-B radiation found at high altitudes (Bishop 2016; Law et al. 2019). The discovery of *P. rhyssothoracicus* not only enriches our understanding of *Psen* diversity at high elevations in China but also provides valuable insights into the genus's adaptations to extreme environmental conditions.

## Acknowledgements

We extend our gratitude to the subject editor and all anonymous reviewers for their valuable and constructive comments. We would like to express our sincere gratitude to Zaifu XU (South China Agricultural University), Shujun WEI, and Hao ZHANG, for their assistance in specimen collecting. This project was supported by the National Natural Science Foundation of China under Grant number 32270485 and the Agricultural Basic Research joint project of Yunnan Province under Grant number 202101BD070001-004.

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